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ecliptic, and as great circles intersect in opposite points,  $E$  will be  $180^\circ$  less than  $A$ , or  $106^\circ 14' 45''$ , and  $180^\circ + PI = 223^\circ 10' 36''$ , the longitude of the point passing the meridian.

The senseless divinations of Astrology, are almost entirely based upon finding the three points of the ecliptic required in this problem, for the moment of birth, at a given place.

Also solved by **EDMUND FISH**, Hillsboro, Ill.

48. Proposed by F. P. MATZ, D. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Penn.

In case of *mischance*, with what force would the cow, weighing  $w=700$  pounds, jumping over the moon, have struck Her Lunar Majesty in the face?

Solution by G. B. M. ZERR, A. M., Ph. D., President and Professor of Mathematics, Russell College, Lebanon, Va.

Let  $m$ =mass of cow on moon,  $g'$ = $\frac{1}{6}g$ =gravity on moon,  $r=2163$  miles=radius of moon,  $a=238840$  miles=distance from earth to moon,  $A$ =momentum  $=mv$ ,  $E$ =kinetic energy  $=\frac{1}{2}mv^2$ .

$$\text{Then } v^2 = 2g'r \left( \frac{a-r}{a} \right), \quad m = \frac{700}{6g'}.$$

$$\therefore A = \frac{700}{3} \sqrt{\frac{2r}{ag'} (a-r)}, = \frac{700}{3} \sqrt{\frac{3r}{ag'} (a-r)},$$

$$= \frac{700}{3} \sqrt{\frac{6489 \times 5280 \times 236677}{238840 \times 32.2}} = 239595.79 \text{ foot-pounds.}$$

$$E = (350r/3a)(a-r) = 1320341350.762 \text{ foot-pounds.}$$

The value of  $A$  is the force required.

## PROBLEMS FOR SOLUTION.

### ARITHMETIC.

83. Proposed by the late REV. G. W. BATES, A. M., Pastor of M. E. Church, Dresden City, Ohio.

A has three notes; the first and second, \$1000 each, and the third \$457; all dated April 1, 1884. The first is due April 1, 1888, second, April 1, 1889, and the third, April 1, 1890, and each bearing interest at 6%. What must B pay for the three notes September 21, 1886 that the investment will bring him 8% compound interest?

[Note—The above problem was the result of an actual business transaction.]

84. Proposed by SYLVESTER ROBBINS, North Branch Depot, N. J.

Show how to find sides, integral, fractional, and irrational for twenty-four triangles, each one containing 330 square yards.